



## Influence of fires on O3 concentrations in the western U.S

**Author(s):** Jaffe D, Chand D, Hafner W, Westerling A, Spracklen D  
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### Abstract:

Because forest fires emit substantial NO<sub>x</sub> and hydrocarbons--known contributors to O<sub>3</sub> production--we hypothesize that interannual variation in western U.S. O<sub>3</sub> is related to the burned area. To evaluate this hypothesis we used a gridded database of western U.S. summer burned area (BA) and biomass consumed (BC) by fires between 101-125 degrees W. The fire data were compared with daytime summer O<sub>3</sub> mixing ratios from nine rural Clean Air Status and Trends Network (CASTNET) and National Park Service (NPS) sites. Large fire years exhibited widespread enhanced O<sub>3</sub>. The summer BA was significantly correlated with O<sub>3</sub> at all sites. For each 1 million acres burned in the western U.S. during summer, we estimate that the daytime mean O<sub>3</sub> was enhanced across the region by 2.0 ppbv. For mean and maximum fire years, O<sub>3</sub> was enhanced by an average of 3.5 and 8.8 ppbv, respectively. At most sites O<sub>3</sub> was significantly correlated with fires in the surrounding 5 x 5 degrees and 10 x 10 degrees regions, but not with fires in the nearest 1 x 1 degree region, reflecting the balance between O<sub>3</sub> production and destruction in a high NO<sub>x</sub> environment. BC was a slightly better predictor of O<sub>3</sub>, compared with BA. The relationship between O<sub>3</sub> and temperature was examined at two sites (Yellowstone and Rocky Mountain National Parks). At these two sites, high fire years were significantly warmer than low fire years; however, daytime seasonal mean temperature and O<sub>3</sub> were not significantly correlated. This indicates that the presence of fire is a more important predictor for O<sub>3</sub> than is temperature.

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### Resource Description

#### Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

#### Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Extreme Weather Event, Temperature

**Air Pollution:** Ozone

**Extreme Weather Event:** Wildfires

# Climate Change and Human Health Literature Portal

**Temperature:** Fluctuations

**Geographic Feature:** ☒

resource focuses on specific type of geography

None or Unspecified, Rural

**Geographic Location:** ☒

resource focuses on specific location

United States

**Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

**Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

**Model/Methodology:** ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction

**Resource Type:** ☒

format or standard characteristic of resource

Research Article

**Timescale:** ☒

time period studied

Short-Term (

**Vulnerability/Impact Assessment:** ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

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